

September 12, 2007

TO: D. Morris

FROM: A. Andujo

SUBJECT: Magnetospheric Multiscale Supportability Study

This study is in response to a request from Magnetospheric Multiscale (MMS) project management. The purpose of this study is to evaluate the DSN's ability to support the four spacecraft MMS mission from October 2014 to December 2016.

Assumptions

Reference information was acquired using the updated mission set database from the February 2007 Resource Allocation Review (RAR).

The period analyzed was October 15, 2014 - January 1, 2017. This period was determined by the trajectory file provided by the mission. Analysis was performed using planned MMS tracking requests of three 4-hour passes per day during the launch and early orbit phase of eight weeks, one 3.5-hour pass per day to support all four spacecraft when the spacecraft orbit is 1.2 x 12Re from week 50 of 2014 – week 39 of 2016 and up to three 8.5-hour passes per week to support all four spacecraft when the spacecraft orbit is 1.2 x 25Re from week 40 – 52 of 2016. All support was allocated to the 34 Beam Waveguide 1. (See Table 1)

There are no planned antenna downtimes in this period. Typically, antenna downtime is planned within 3 – 4 years; therefore it is too early to determine the impact of downtime in this period.

MMS trajectory information analyzed in this study is from viewperiods derived from the ephemeris file provided by the mission. (See Figure 1)

This analysis period is still too far out to truly capture the DSN requirements and loading, as the mission set is not yet fully developed. Many of the current and future missions may continue operations into this analysis period. (See Table 2) Table 2 describes the missions that are planned to continue operations into this analysis period either as part of their Prime or Extended mission, additionally the table lists Future missions that we do not have requirements for and have not been analyzed in this study. It is recommended that another study be generated closer to launch date.

Summary of Results

The results of this study indicate an average supportable percentage 97.5% (See figure 1 and 2). Based on the current information the DSN is capable of supporting the MMS Mission with little or no contention. With the exception of the two weeks in the end of 2015 supportability is well above 95%. The two weeks where supportability is reduced are due to requirements of Mars Science Orbiter 2013 TCM, however supportability is still well above the 80%.

Based on the current analysis case the mission is fully supportable from launch through end of mission. It is recommended that another study be generated closer to launch date.

As always, the results of this study are subject to change, in that network loading changes as requirements for planned missions are input and updated and periods of antenna downtime are identified. We will continue to work with MMS and other users of the DSN to maximize the time available for each individual user.

User Loading Profiles

Concurrence:

Date _____

VP			Durations		Calibration		January		February		March		April		May		June		July		August		September		October		November		December																														
Object	User	Resource	Ave	Min	Pre	Post	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53

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Figure 1: MMS Viewperiod Duration Plot 2014 – 2016

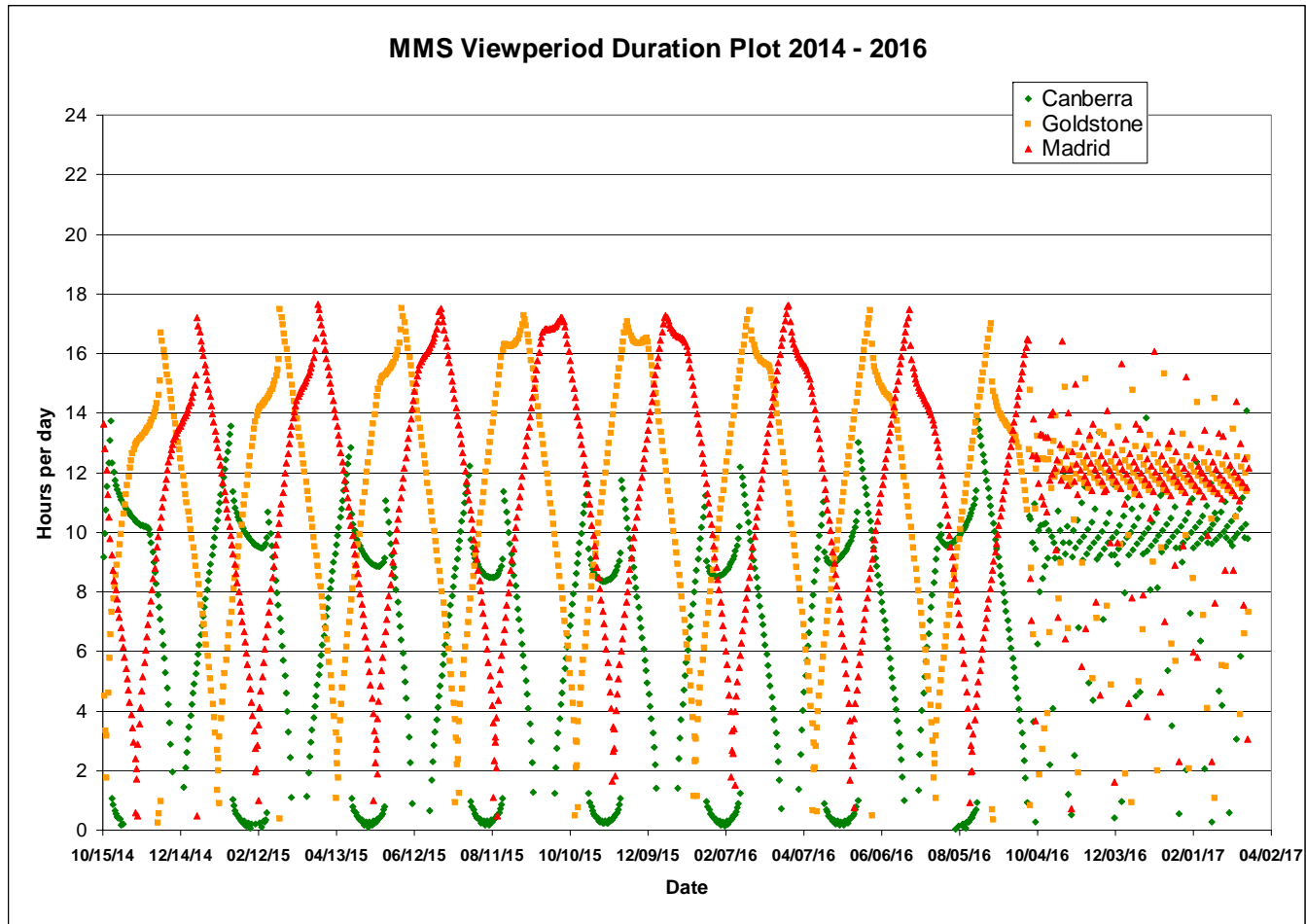




Table 2: DSN Advanced and Ongoing Mission Set 2014 - 2016

Project	2014	2015	2016
Advanced Tracking and Observational Techniques (ATOT)			
Beyond Einstein 1			
Chandra X-Ray Observatory			
Dawn			
Discovery Mission 13			
Discovery Mission 14			
DSN Antenna Calibration			
DSS Maintenance			
European and Global VLBI Systems			
Goldstone Solar System Radar			
Ground Based Radio Astronomy			
James Webb Space Telescope			
Juno			
Magnetospheric Multiscale			
Mars Astrobiology Field Laboratory			
Mars Reconnaissance Orbiter			
Mars Science Laboratory 2009			
Mars Science Orbiter 2013			
Mars Scout 2011 (TBS)			
MESSENGER			
MIDEX-08			
Mission of Opportunity 3			
Mission of Opportunity 4			
New Frontiers 3			
New Horizons			
Outer Planet 1			
Rosetta			
Solar Sentinels			
Space Geodesy			
Spitzer Space Telescope (SIRTF)			
Voyager 1			
Voyager 2			

Prime Mission = 
 Extended Mission = 
 Expected Support not analyzed = 